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The Study of Safety Factors In the Production of Red Wine

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Abstract: Currently, a lot of attention is paid to the qualitative characteristics of wines. Red wine is characterized by a rich complex phenolic complex and has a high antioxidant capacity, predetermined by the high content of phenolic and coloring substances. Almost all groups of wine substances are involved in redox reactions - carbohydrates, phenolic and nitrogenous substances, organic acids. The intensity of the passage of oxidative enzymatic processes depends on technological methods, creating conditions for the passage of secondary redox processes. Based on the results obtained, the technological canons of winemaking were adjusted, for example, when processing red grapes, additional measures are clearly needed to ensure antioxidant protection.

Keywords: Oxidation, oxygen, enzyme, antioxidants, antioxidant defense system, heat treatment, cold, fermentation.

Introduction

The main directions of development of the national economy of Uzbekistan provide for the expansion of the range and improvement of the quality of food products, including wine-making. In red wine, polyphenols block the interaction of SO_2 with oxygen. In general, SO_2 is required to remove hydrogen peroxide, and polyphenols are required to block the "SO_2-oxygen" interaction, and only when SO_2 and oxygen are combined is their full antioxidant effect in wine realized.

The relevance of research lies in technological operations, especially those that bring wine into contact [1] with atmospheric oxygen (pouring, opening containers, filtration, adding tannins) also have an impact. There are still many aspects concerning oxygen reactions in wine that remain unclear and research in this direction needs to be continued. Moreover, cold treatment of dry red wines leads to an increase in oxygen concentration, which threatens to oxidize phenol-coloring substances in the composition of wine and causes a change in the color and taste of wine, this technological method for red wines is recommended in exceptional cases. Therefore, heat treatment of red wines provides an increase in oxygen concentration and at the same time activates all the components of the antioxidant defense system, i.e. There is a dismutation and the formation of organic peroxides. Over time, heat treatment enhances the antioxidant activity, and the antioxidant activity increases more intensively during heat treatment, somewhat lower than the antioxidant activity during cold processing. Food analysis is characterized by another indicator - the content of antioxidants. [2] The spectrum of antioxidants that make up wines is represented by phenolic components of mono, oligo and polymer structures, anthocyanins, ascorbic acid, catechins, tannin, etc., which, during technological processing, participate in adding aroma and taste, determining the quality of wines. It is known that white and red wines differ both in qualitative and quantitative composition. It is known that white and red wines

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differ both in qualitative and quantitative composition. Given that antioxidants are all easily oxidized components of wine and the possible presence of radicals, [2] reactive oxygen species, predetermines their interaction. It seems relevant to study the enzymes of antioxidant protection and compare their behavior during the technological methods of processing different-colored wines.

For the study, we chose the technological processing of secondary winemaking (pasting with bentonite, heat treatment). [3] Samples were taken for analysis before and after treatment. The concentration of molecular oxygen, enzymes of the antioxidant defense system (AOZ) of white and red dry wines were determined and compared.

Table 1. Physical and chemical composition of the studied wines

Studied material	Specific weight	Fortress %	Titratable acid, mg/dm^3	Volatile acidity, g/dm^3	SO_2 mg/dm^3
Dry white wine	0,987	10,8	5,2	0,59	96
Dry red wine	0,990	11,2	5,6	0,59	100

It should be noted that the studied enzymatic systems of antioxidant protection are quite complex and therefore the technological methods adopted in winemaking have inadequately affected their activity. Thus, the maximum concentration of molecular oxygen (10.64 mg/cm^3) was noted after heat treatment of dry red wine, and the minimum content was determined in a sample of dry white wine after cold treatment (1.71 mg/cm^3). The greatest change in the concentration of molecular oxygen was observed in red wine after cold treatment. The oxygen concentration decreased by 5.57 mg/cm^3. And the largest increase in oxygen concentration (4.63 mg/cm^3) was noted in dry red wine after heat treatment. Processing red wines with heat increases the concentration of oxygen and at the same time activates all the components of the AOP system those dismutation and formation of organic peroxides. White wines in this case behave somewhat differently. The AOP system is equally affected by fining and cold treatment, but when treated with heat, white and red wines behave inadequately. The main processes [4] that occur during fermentation are the extraction of polyphenols, the production of alcohol (8-15%), the extraction of color pigments - anthocyanins, the production of carbon dioxide (CO_2), the release of energy, the formation of aromatic compounds - such as esters, polyatomic alcohols, fatty acids. The difference between the production of white and red wines is that in the manufacture of red wine, fermentation occurs with the skin (on the pulp), while in the manufacture of white wines, only the juice ferments. If at the same time fermentation is undesirable, the temperature is lowered to 12^0C. The reason for stopping alcoholic fermentation can be high sugar concentration, low nitrogen content, a decrease in thiamine, excessive clarification of the must, pesticides and lack of oxygen. Maceration - the process associated with the insistence of the must on the pulp, differs in time for white and red wine. [5] The infusion of white must on the pulp is carried out before fermentation, for red wine this process is carried out during and after fermentation. The duration of maceration for white wine does not exceed one day, for red wine it can be 1-2 weeks or more. The main accumulation of anthocyanins in wine during maceration occurs within 7 days.

Cold maceration before fermentation (-5^0C $+5^0$C) for 48 hours for red wine improves the characterization of the wine, both in terms of chemical analysis and in terms of taste characteristics. Unlike maceration, which is carried out after the fermentation process, carbon dioxide maceration can be used to produce red wine before fermentation in an atmosphere of carbon dioxide.

After fermentation and maceration, the wine (red) is separated from the sediment and solid components (skins, stems, seeds). [6] Gravity is the wine of the highest quality, while the remainder is pressed one or more times, resulting in a more pigmented and tannin-rich wine.

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Conclusion

The difference between the production process of red and white wine lies in the processing of the components of the grapes (juice, seeds, skins and stems) as well as in the clarification processes before, during and after fermentation. The skins provide red wine with coloring and tannic acid, so fermentation takes place before pressing. Stopping fermentation is carried out in various ways, among which: sulfitation (sulfur dioxide), heat treatment (heat or cold), maintaining low temperatures during fermentation to accumulate CO_2. In the manufacture of strong, dessert and liqueur wines, alcohol and other ingredients are added to grape must during fermentation or to blending in secondary winemaking. Fortified oxidized wines include wines such as port, Madeira, sherry. Heat treatment contributes to an increase in the activity of the AOD system, approximately the same as pasting. But the increase in the concentration of molecular oxygen during heat treatment is approximately half as much as during pasting. Therefore, cold treatment increases the tendency of the wine components to oxidize, while techniques such as fining and heat treatment prevent the wine components from oxidizing.

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